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Differentiation, Robert Sternberg's Triarchic Theory of Intelligence, and their affect on the Historical Analysis Skill

A Research Project Presented to the Faculty of Sweet Briar College in Partial fulfillment of the Regulations for the Degree of Masters of the Arts in Teaching

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Chapter 1

The purpose of the history classroom is to provide for student exploration of the human experience using the events from our world, our country, and our locality. This exploration allows for a direct application of common human experience across ethnic, racial, geographic, and political boundaries. Fundamental to this exploration is the historical skill analysis which historians use to explain how and why events occurred as they did. Historical analysis involves: comparing and contrasting different ideas, values, behaviors, and institutions, understanding the difference between historical fact and historical interpretation, considering multiple perspectives surrounding an event or phenomena, identifying the cause and effect relationship between events, people, and ideas using historical facts and primary and secondary sources. Without using the historical analysis skill, students will do little more than memorize historical events.

The teaching of historical analysis is minimal in many classrooms because standardized testing of history focuses the student on memorization of historical facts. Many teachers, feeling pressure to help all students meet the standardized test's requirements, often do not push students beyond this memorization level. Students need to be challenged beyond the minimum requirements set by standardized testing. This trend to set the standard at students knowing material rather than understanding it in depth has created a deficiency in students' ability to comprehend the nature of the history field and therefore in understanding historical events.

Studying history is not limited to the study of facts, dates, and events. Many historical facts have been based on interpretation by professionals in the field, most contested by other professionals. Limiting the study of history to memorization of facts forces objectivity into a field that is quite subjective and is at times misleading by

enforcing one "truth" where there might be many. The study of history should incorporate historical skills, processes, concepts, as well as content to understand historical facts and their many interpretations.

This study investigates the relationship between the educational pedagogical method of differentiation and the historical analysis skill. The purpose of this study is to apply differentiation to the study of history by testing the effect that differentiating the learning profile has on the historical skill analysis. The study hypothesizes that differentiating instruction by Robert Sternberg's theory of Triarchic intelligence will positively effect students' ability to develop the historical analysis skill. The null hypothesis, therefore, is that differentiating instruction by Triarchic intelligence will have no effect on students' ability to develop the historical analysis skill.

If a positive relationship is found between differentiating according to Sternberg's Triarchic theory and historical analysis the implications would be far reaching. Studies show a positive relationship between Sternberg's Triarchic theory and achievement on both memory and performance based assessments. If this theory is also linked to the skills and understandings specifically found within the field of history then there is a strong case for its practice in the history classroom. However, the scope of this study does not encompass the gaining of historical skills beyond analysis. The relationship between differentiating according to Sternberg's Triarchic theory and historical skills should be further explored through examining multiple historical skills.

Chapter Two

The fundamental question guiding this research is: will differentiating by Sternberg's Triarchic theory of intelligence improve secondary history student's historical analysis skill? For the purpose of this inquiry the research is divided into two categories: historical understanding research and educational research. The purpose of the division is to show the theories and principles of educational research and their discussions or adaptations by teacher historians who are the primary arbiters of the history field. A review of Sternberg's Triarchic theory in the context of differentiation and historical analysis is necessary to integrate differentiation, Sternberg's theory and the study of history.

Because the study focuses on differentiating using the Triarchic theory of Intelligence much of the research materials in the education category are authored, in part, by Robert J. Sternberg. In his "Principles of Teaching for Successful Intelligence," he outlines twelve principles that teachers must institute to utilize his theory successfully. These principles provide teachers with clear guidelines by which they can self-assess their use of the theory, allowing them flexibility in learning, implementing, and assessing the theory. If the theory is executed according to Sternberg's principles any lack of success is due to failings with the theory itself showing a cause for revision or abandonment (65). For this study, the article aids the understanding and implementation of Triarchic theory and in designing the lessons used. The article "Successful Intelligence in the Classroom" is also useful to this end.

"The Triarchic Theory of Successful Intelligence," and "Teaching for Successful Intelligence: Principles, Procedures, and Practices," by Robert Sternberg, describes the theory and its creation. He also discusses the construct of intelligence as a measure of

ability as it relates to his theory. He defines intelligence with four criteria[1] which are expressed through the analytical, creative, and practical abilities. These articles deal with intelligence and the interactions with environment and the classroom as it applies to the theory. Sternberg describes the theory with more detail and reasserts the twelve principles outlined in "Principles of Teaching for Successful Intelligence."

Three studies on Sternberg's theory were used in researching this study. The first was, "Teaching for Successful Intelligence Raises School Achievement," by Robert Sternberg, Bruce Torff, and Elena Grigorenko; the second is "Teaching Triarchically Improves School Achievement, by the same authors; and finally, "Applying the Triarchic Theory of Human Intelligence in the Classroom," written solely by Robert Sternberg. These studies give examples of real applications of Triarchic theory in the classroom as well as showing improved student achievement on both higher order and memory based assessments.

Carol Tomlinson of the University of Virginia, one of the primary founders of differentiation, authored much of the other education literature. This study uses two of her works, *Fulfilling the Promise of the Differentiated Classroom* and, *The Differentiated Classroom: Responding to the Needs of All Learners.* This study also uses one *Leadership for Differentiating Schools and Classrooms*, co-authored with Susan Demirsky Allan. These books provide the core framework for using differentiation in the study.

Fulfilling the Promise of the Differentiated Classroom and *The Differentiated Classroom: Responding to the Needs of All Learners,* outlines the philosophy of

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[1] These criteria are discussed in detail in the section **Sternberg's Triarchic Theory of Intelligence** on page 17

differentiation and its implementation in a classroom. Each text discusses the foundation of good teaching in response to the needs of all learners. They also outline the importance of an open, safe, and supportive classroom environment, and strategies that allow instruction to be differentiated.

Leadership for Differentiating Schools and Classrooms discusses how to incorporate differentiation in school-wide curriculum structure. More importantly, it discusses the supportive research behind differentiating instruction. The text provides a case study on a school district in Charlottesville, Virginia that incorporated differentiation in order to provide enrichment activities to identified gifted learners without excluding other learners from the community. In this case study, the Charlottesville district was successful in integrating a district-wide differentiation curriculum which satisfied identified gifted learners while still promoting achievement for struggling learners.

A review of historical understanding research reveals how the skills and concepts, common across multiple disciplines, are uniquely utilized in the historical process. The review also provides a definition for history, as a discipline and as understanding, and provides its context within educational structures. For instance, analysis as a skill is used differently in chemistry than in history. In history the skill is used to compare phenomena within or across civilizations (Suzik, J.R., 406). Historical analysis requires different processes, habits, and ways of thinking, which suggests that a transfer of skills is necessary as learning the skills from one discipline will not teach the skills for the other (P.J. Lee, 30-31).

"History Teaching and Philosophy of History" by P.J. Lee is one of the more persuasive sources in the historical understanding category. He presents clear and

concise supportive evidence for a variety of viewpoints surrounding historical education. He defines three approaches to history education. The first approach concludes that teaching history is "handing on substantive historical concepts." The second approach concludes that it must develop "children's understanding of structural second-order concepts." The third approach concludes that teaching history "is teaching historical skills, abilities, or procedures." Lee discuses the advantages and disadvantages associated with each of the assertions and posit that teaching history is a combination of all three.

Although not as far-reaching in scope as P.J. Lee in dealing with all points of view, "History in the Curriculum: Debate on Aims and Values" by James Fitzgerald is a necessary component in explaining the value of history in education and the parameters of the discipline in school systems. He divides the article according to debates in the U.S. and debates in the U.K. giving an account of the parameters of history education, which he essentially defines under the broad categories of "story" and "inquiry."

James Miller's and James Hart's "Testing History as Inquiry" is a synthesis of historical inquiry and the educational theory of Bloom's taxonomy of higher order thought. The text compares traditional assessment with "inquiry assessment" displaying the ability to assess for historical understanding. Their position follows the premise that history in education should be inquiry based. However, the authors fail to address the differences between Bloom's cognitive skills, which are broad overarching skills, and the skills specific to the history discipline. This difference is of the utmost importance because Bloom's cognitive skills are conceptual. The broadness of concepts cannot be directly applied to specific discipline skill-sets; they must be transferred and adapted to

fit specific needs. Despite this discrepancy the article is important in relating the ability to address historical analysis to the public school environment.

James Suzik's "Focusing on Analytic Skill-Building in the History Classroom" is a short abstract describing the purpose and need for the Carnegie Mellon "World History Project." The abstract of this study helps to explore the idea of analysis and history education in high school.

History as a Field

Charles A. Beard categorizes history into four divisions; record, knowledge, actuality, and thought. In the first division, record, history is the means to which ideas, events, people, and places are conveyed across time. Through primary and secondary documents, the narratives and accounts form historical record. In the knowledge division, history is comprised of dates and facts. For example, Beard states, "George Washington was the first President of the United States under the Constitution. John Adams succeeded him; and Thomas Jefferson was inaugurated in 1801" (50). In the third division, actuality, history is conceived in the present. The last division, thought, contains conclusions and interpretations made from the selection and arrangement of record and knowledge. Of this process, Beard states that facts, "are chosen and ordered by the historian with reference to some frame of ideas, purposes, and philosophy which he has in mind, more or less consciously," (51). The subjectivity of historical "fact" is inherent in the process of defining history.

Beard feels positive that history is treated "as if it were something about as definite as the multiplication table, as if it were something that inevitably takes form in

the mind when the past is studied, or as if it were a frame of ideas which inexorably comes out of the records when the past is under consideration" (52). However, "there is a long tradition that teaching history is self-evidently handing on to children in simplified form whatever account of the past (or of certain passages of it) has been given by professional historians" (Lee, 19). The choice of accounts may lead to an unbalanced treatment of the "records," "knowledge," and "thought." The relegation of history as fact is a disservice to history as a field and to the students who are, by the nature of such a system, deprived of experiencing the multifaceted view of the historical record. History as fact denies the nature of history as an ever changing entity. Instead, history should be treated as "thought about the past, checked and controlled to a certain extent by the known facts of the past," (Beard, 52).

Historical Understanding and Education

Debate exists on the best practice of teaching history. P.J. Lee, in his "History Teaching and Philosophy of History," outlines this debate by showing three viewpoints. The first viewpoint is founded on the ideas of Bruner and Hirst. The second is a response by their critics; the third is a response to Bruner and Hirst's critics. These viewpoints are categorized as: "handing on substantive historical concepts," "children's understanding of structural second-order concepts," and that teaching history "is teaching historical skills, abilities, or procedures." The arguments made by James Fitzgerald in "History in the Curriculum: Debate on Aims and Values" have similarity enough to fit in these categories which, are used for the purpose of this study.

Chapter Two

"Handing on substantive historical concepts," means that the teacher frames the curriculum around historical concepts. This style of teaching is helpful in narrowing the content into more manageable sections and offers freedom from pure memorization of facts (Lee, 21). However, Lee discusses three criticisms of this approach. The first criticism questions who chooses these substantive concepts and why? This criticism states that little objectivity in producing these concepts or in determining the content that should be used to convey it is established. In reply to this critique Lee responds, "Attempts to avoid the issue of historical criteria of selection by invoking educational criteria [this] can in turn lead to something very close to Oakeshott's 'practical past,' in which history is organized to fit some practical present interest," (Lee, 22). Educators should be skeptical of molding the educational structure according to any specific interest since such an approach may lose objectivity in favor of a more subjective interest. Present circumstances, ideals, and modes of thought are not appropriate criteria to define the events from the past.

The second critique of the substantive concept approach is whether concepts that are specific to history actually exist. While no definitive end to this debate exists, history provides tangible examples of concepts as they have actually occurred. Lee offers the example of the fascist and democratic state (Lee, 23). Another example is the idea and understanding of revolution. Revolution as a concept could not exist if it had never occurred or was never studied.

The third criticism of the substantive conceptual approach is the debate over whether history should center on concepts or specific individuals, events, or places. Ideas like the Renaissance, the Reformation, or the Industrial Revolution provide a substantive

framework for history that concept, such as "Renewal," "Reform," and "Revolution" cannot achieve. However, history's ability to convey those concepts through its structural framework is of primary importance in historical education. The history framework can empower conceptual instruction methods, promoting understanding of the content rather than memorizing it, (Wiggins and McTighe, 67-69).

However, educators must be careful in using a historical conceptual approach so that they do not teach concepts and ignore the historical record and knowledge. "Grasping a concept *does* mean grasping a rule, but the rule is empty without instances, and instances differ radically over time, often stretching the rule to breaking point. This is what makes historical understanding of concepts important." To have a historical understanding of revolution, one would need to explain why, how, and what effects revolutions have by citing specific examples from revolutions. "Plundering history for 'illustrations' is unhistorical because it fails to recognize that at the bottom learning history is learning about the rational investigation of the past." He further states that some conceptual approaches to instruction render history a completely useless tool because history could be substituted by a purely fictional history, as in the works of Tolkien, with the same conceptual outcome (Lee, 24). The concepts or big ideas must be a focal point, a tool for assessing understanding of the content. "But such concepts and skills must of course be developed through historical content" (Lee, 25). Teaching history through a conceptual approach must investigate the broad concepts while citing historical evidence.

Developing "Children's understanding of structural second-order concepts" is the second viewpoint that Lee discusses. Whereas substantive concepts are field specific

concepts, second-order concepts are broader, and multi-faceted. He uses evidence, "Cause," "Empathy," "Change," and "Time" as examples of second-order concepts in the history field. Not much difference in these two approaches is distinguishable; indeed, both approaches face the same obstacles. However, new concerns are raised by this approach. Lee cautions that all of these second order concepts are transmitted through a body of content and are designed to delve into and answer historical questions more successfully. Therefore, an educator must be particular in assessment because one can show an understanding of the concept within a lesson without showing understanding of historical contexts which it takes place in (Lee, 25-26). The assessment must measure the historical understanding, not the conceptual understanding solely.

The third and final viewpoint is to teach historical skills, abilities or procedures. This approach provides an application for the concepts of the prior approaches. Not only are the students learning about "Evidence," "Bias," "Time," and "Change" but they are also given the tools to apply them in the history process (Lee, 28). This approach has its critics as well though. Krug states "the few historians who have tried to find some order, rhythm, or structure in history have done so with limited success" (Fitzgerald, 85). Krug suggests that this approach can lead to an overly technical treatment of historical understanding by focusing on gathering and analyzing evidence without developing synthesis or the explanation skills which are necessary to history. He also raises the widely held doubt, "about the desirability of trying to make historians out of students who have no intention of becoming historians in adult life" (Fitzgerald, 86). This opinion is shared by W.B. Stephens who states, " to compare the mature work of historical research with the exercises conducted by children from limited and pre-selected

material…is the sort of clap-trap that brings the scholarship of educationists into doubt," (Lee, 29). While these scenarios are a possible outcome of this approach if one places the appropriate emphasis on all aspects of history, records, knowledge, thought, and process, rather than on the skill alone the issue may not arise. The assumption made by critics is that elementary and secondary school systems are trying to produce professionals in all fields. Separating the field of history from the study of history creates a duality which does not exist and creates a schism between the student and the material. Therefore, historical understanding must be taught through concepts by applying the historical skills of analysis, empathy, communication, evaluation, and synthesis on the content of study, (Fitzgerald, 96; Lee, 37, 44, & 48).

Differentiation

This study will examine differentiating instruction as a means of teaching for historical understanding and historical concepts using the content as a vehicle. "The idea of differentiating instruction to accommodate the different ways that students learn…is an approach to teaching that advocates active planning for student differences in classrooms" (Tomlinson, 1). Students have varying backgrounds, abilities, and modes of thinking and processing which necessitate the employment of varying structures of learning within a lesson and within a classroom dynamic. Carol Tomlinson represents this dynamic interaction between students, teachers, and curriculum visually with "The Cogs of Differentiation" (Fulfilling the Promise of the Differentiated Classroom; Figure 1.2, pg. 11). One can differentiate the content, process, or product by readiness, interest, or learning profile (Tomlinson: Fulfilling, 2-5).

Content, process, and product all deal with the material learned. Content refers to facts, data, or skills learned. Process refers to the means of learning the material. Products are what students create to show that learning has occurred; written work, posters, presentations, projects are examples of products (Tomlinson: Fulfilling, 5). Readiness, interest, and learning profile are based on students and their specific needs. Readiness is the preparedness of the students in dealing with the subject or concept, interest refers to the attraction of content or style, and learning profile is the way in which students learn (Tomlinson: Fulfilling, 2-3). A more concise definition of learning profile is, "ways in which a student best processes information and ideas, and ways in which learning style, gender, culture, and intelligence preference influence the student" (Tomlinson, and Allan, p. 26). This study narrows the focus to differentiating content and the historical skill analysis, by learning profile according to Sternberg's Triarchic Intelligence to determine whether a positive relationship exists between them.

Though there is not one particular method for differentiating, pre-assessments are utilized to determine student levels of comprehension, abilities, or needs. How the lesson is differentiated must adhere to the objectives of the course and be based on needs of the learners (Tomlinson: Fulfilling, 10). This process begins with identifying the goals and concepts intended for study. Most are usually derived from mandated standards. Then, standards and measures of assessing the goals and concepts are determined. Finally, means of conveying the goals and concepts is created; the means are based on student needs and are determined by the pre-assessment (Wiggins and McTighe, 17-32). In the final stage, the method of differentiation is established based on an observable need. The historical skill analysis involves critical thinking; therefore, differentiating this skill

according to intellectual strengths in Sternberg's Triarchic theory is in alignment with the differentiation process. However, the pre-assessment determines how the students are categorized; in this study, pre-assessment determines whether the students are analytic, creative, or practical.

The research on differentiating according to learning preference is largely based on studies of John Gardner's Multiple Intelligence theory and Robert Sternberg's Triarchic Theory. Of MI research, Tomlinson states, "For example, Campbell and Campbell (1999) write about increased test scores for students in six schools with very different demographics (two elementary, two middle, and two high schools) as a result of a multiple-intelligence focus in instruction," she also states that, "Both students and staff in these schools reportedly found a new enthusiasm for teaching and learning as a result of the multiple-intelligence focus as well," (Tomlinson and Allan, 29). Tomlinson has also found that, "Studies continue to find that when students are matched to instruction suited to their learning patterns (e.g. analytic, creative, practical), they achieve significantly better than comparable students whose instruction is not matched to their learning patterns." The success of these two approaches shows the importance of differentiating instruction and assessment according to learning preference, (Tomlinson and Allan, 28).

Sternberg's Triarchic Theory of Intelligence

In addition, research from Sternberg further validates Tomlinson's claim of the importance of utilizing students' intelligence preferences on academic achievement. Two studies conducted by Sternberg have shown that a significant relationship is observed

between teaching using the Triarchic theory and student achievement on performance based and memory based assessments. Students who were taught with the Triarchic theory outperformed students who were taught in either a traditional manner or analytically (Sternberg, Torff, Grigorenko, *Teaching Triarchically Improves School Achievement*, 382).

The first study's test subjects were 213 third graders of a low socio-economic status from Raleigh, North Carolina studying Social Studies. The students were divided into three groups: an experimental group, a control group, and a strong control group. The experimental group received Triarchic instruction, the control group received traditional instruction, and the strong control received analytical instruction. Sternberg justifies the presence of the strong control group by a sole analytic approach to critical thinking occurring in response to traditional teaching. The second study had the same structure, but was studying 141 eighth graders who participated in an intensive summer study course at Yale University. The eighth graders were of a middle and upper middle class socio-economic background.

In all areas of assessment, those receiving Triarchic instruction scored significantly higher than those receiving traditional instruction. In many areas, the Triarchic instruction group also scored significantly higher than the analytic instruction group. When the Triarchic instruction group did not score significantly higher than the analytic instruction group, it still scored higher however, not significantly. The analytic instruction group usually scored significantly higher than the traditional instruction group. These scores include multiple-choice assessment of memorization, which is usually linked to traditional methods of teaching. However, despite dealing with the

studies' significance, Sternberg does not discuss why this study is important to educational theory.

One component of this study that has yet to be defined is Sternberg Theory itself. The theory states that three abilities of intelligence are discernable; they are analytic, creative, and practical. According to Sternberg these abilities are used in interacting with phenomena for "successful intelligence." Successful intelligence is:

> (1) The use of an integrated set of abilities needed to attain success in life, however an individual defines it, within his or her socio-cultural context…(2) recognizing their strengths and making the most of them, at the same time that they recognize their weaknesses and find ways to correct or compensate for them…(3) adapt to, shape, and select environments through (4) finding a balance in their use of analytical, creative, and practical abilities (Sternberg, *Triarchic Theory of Successful Intelligence,* 104).

This theory explains expressions of intelligence through three intertwining sub-theories. These sub-theories are centered on the interior world of the individual, the exterior world of the individual, and the experiences of the individual. The interior world sub-theory concerns the processes of recognizing problems, formulating a plan to deal with the problem, and applying that plan to the problem (Sternberg, *Triarchic Theory of Successful Intelligence,* 105). The exterior world sub-theory concerns environmental and socio-cultural contexts of the intellectual process involving selection, shaping, and adaptation of environments to suit the needs of the individual (Sternberg *Triarchic Theory of Successful Intelligence,* 111). The experiential sub-theory concerns the

measure of intelligence while the individual is experiencing new phenomena or prior to the internalization of the intellectual behavior (Sternberg *Triarchic Theory of Successful Intelligence*, 109). The studies conducted by Sternberg show that Triarchic instruction aids students in achieving successful intelligence (Sternberg *Triarchic Theory of Successful Intelligence*, 114-116).

Because studying history surpasses simple memorization of dates and facts, developing strategies which encourage students to conceptualize is essential. Providing strategies and scaffolding for student discovery and understanding of content, concepts, and skills aids students in deepening their understandings of history. Differentiation as a philosophy provides a way of thinking about education which naturally supports gaining depth of knowledge in a discipline. Testing the effectiveness of differentiating according to Sternberg's Triarchic theory illustrates whether students gain skills in acquiring depth of historical knowledge.

Chapter Three

Method

To test the hypothesis that differentiating instruction by Sternberg's Triarchic theory of intelligence positively affects students' ability to develop historical analysis, a baseline, pre-treatment assessment and a post-treatment assessment were incorporated. This study utilized a single class as a sample. The sample was taught and assessed for historical analysis at first without and then with the theories of differentiation and Sternberg's Triarchic theory of intelligence.

The control for this study was the assessment of students' historical analysis skill prior to the introduction of the treatment which was differentiating by Sternberg's Triarchic Intelligences. The instruction in the pre-treatment was not differentiated according to Sternberg's triarchic theory. In the post-treatment phase, the students are assessed for historical analysis after receiving differentiated instruction according to the triarchic theory. The data from the pre and post-assessments were then compared to chart the growth of the students in historical skill analysis. Due to the small size of the class, the Wilcoxon Signed-Rank test, a non-parametric test that is related to the dependent t-test, was utilized.

Stage one was to pre-assess the students, determining their Triarchic intellectual ability for student groupings according to analytic, creative, or practical categories. This stage was to begin on February 7, 2006. To measure the historical analysis skill students were asked to explain in a quick-write their understanding of the study of history. The students were asked to repeat this exercise after the study was completed. Finally, the students wrote concerning the justification of Austria-Hungary and Germany declaring war in WWI; this writing assignment was assessed for historical analysis and used to

determine the students' initial historical analysis abilities. This data, along with the data from stage two, was later compared to the post-treatment data.

Stage two contained lessons in historical analysis. The students were instructed in the method of historical analysis, how it is used by the historian, its significance in the historical field, and saw exemplars of various historians' processes for historical analysis. Starting on February 11, the students were instructed utilizing traditional methods. The students were then assigned various writing products throughout stage two to display their historical analysis skills. These types of assignments were given until a baseline[1] was established. The assessments determined students' levels of historical analysis.

Stage three, the treatment, featured the introduction of Sternberg Intelligences by means of differentiation. This introduction occurred once the baseline scores in historical analysis were determined. An exact date was not identified due to the nature of determining a baseline. In stage three, students were grouped according to their Sternberg intelligences for both the learning process and the assessment products. Placing students in Sternberg groupings using their intellectual strengths during the learning process aids them in learning both the skills and the facts of history as well as understanding how and why events occur. Supporting their strengths aids students in relating what they have learned to the best of their abilities. When the final treatment score was assessed students performed another quick-write explaining what history means to them. The pre-treatment quick-write and the post-treatment quick-write are compared and contrasted to see if students views of history change.

Students' products' from stage three were assessed for historical analysis. This data was compared with the data from stage two to either reject or accept the null

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[1] A group of scores that are very similar in number

hypothesis. The purpose of the two quick-writes was to compare student ideas concerning history as they grew in understanding of historical analysis whereas the other assessments charted students' abilities in using historical analysis.

Population and Sample

The sample for this study was chosen from the 15-16 year old students of Amherst County high school in Amherst County, Virginia. The class consisted of 25 students in an Advanced World History program; 22 of which are Caucasian, 2 African American, and 1 of Asian. As one would expect from advanced students, many of them exhibited concerns for their grades, strong capability to learn and understand material, and held high expectations for their academic work. One student in particular was already quite knowledgeable about history; he constantly sought a challenge.

The population was not randomly chosen since the sample was a classroom of students assigned through the student teaching placement. They were chosen because the author had already worked with them in a classroom setting during the previous semester. All involved were comfortable with each other and the classroom environment. This class was one of the first classes relinquished in the student teaching process and afforded the most time to carry out the research procedure. The advanced students need to be challenged appropriately. The study is therefore testing a sample from the population which exhibits the most need.

Chapter Four

Implementation of the Design

The actual design that was implemented differed from the design layout discussed in Chapter Three, however, the basic structure remained the same. The sample size was reduced to 15, students were assessed before and after the treatment, and those assessments were used to determine whether differentiating by Sternberg's Theory of Intelligence positively affected students' historical analysis ability. The variations from the original research design are discussed below; however, the reasoning and effects on the study will be discussed in Chapter Five.

Stage one of the design was implemented close to the original plan. Students were given Triarchic Intelligence assessments, as found in the Sweet Briar College educational packet "Get to Know Your Kids." These assessments were used to design the lessons which were used for the Sternberg Intelligence instruction. Students took the baseline assessment, which was used as a beginning to chart student's abilities prior to the treatment. However, time constraints within the study prevented the study from including the assignment concerning students' thoughts on the definition of history. Because this assignment was dropped, no comparison to a later version could be drawn.

In stage two, the pre-treatment assessment stage, the plan outlined for students to learn what historical analysis is, why, how, and by whom it is used. However, the lessons for historical analysis did not occur. The time required for preparing students for the VA SOL test precluded the historical analysis lessons. The students, however, did still perform historical analysis and improvement was seen over time despite the absence of an explanation of the historical record, knowledge, and thought. The students were taught more traditionally during this time period. Though there were multiple instances

of differentiation in the classroom, none were according to Sternberg's theory and they were outnumbered by traditional methods. Students were assigned writing tasks to display their historical analysis abilities from the historical record. This data was analyzed according to a rubric of historical analysis. The rubric was created by the author based on standards from UCLA's National Center for History in the Schools as found on their website http://nchs.ucla.edu/standards/thinking5-12_toc.html. These standards were adopted by the National Governor's Association and by George H. Bush C. 1990. They outline five standards; however, the only standard that concerns this study is standard 3: historical analysis and interpretation. Although never field tested, this rubric was invaluable since it was the standard at which students were held accountable for historical analysis (Appendix B).

For the third stage, students were periodically placed in Sternberg groupings or given tasks according to their Sternberg pre-assessment. The products from the group work were not assessed for historical analysis to prevent error. No clear way of determining whether student x had scored higher or lower due to his or her own merit or due to his or her group members placed group work outside the scope of this study. However, all products from the Sternberg tasks, which students performed individually, were assessed for historical analysis based on the study's rubric. There were three of these individual Sternberg tasks; they were assigned on March 16, 30, and April 3. The quick-write which would have been used to assess students understanding of historical analysis was abandoned; furthermore, time did not permit questioning the effect the different activities had on learning environment.

Data Analysis

The data was collected and assessed according to the rubric described and analyzed using the Wilcoxon Signed-Rank test which compares the scores of two "samples," in this case before treatment and after treatment data. The negative signed rank data occurs due to the higher scores in X_b column, the post-treatment scores. This finding shows that differentiating by Sternberg's Triarchic theory does have positive effect on the historical analysis skill, but is it significant?

Because the hypothesis showed movement in a singular direction, the single tail p was used for the measure. The p value was found to be .0001 meaning that there is a .01% chance exists that the results would be similar if the null were true. Analyzing the z-score provided similar results. The z-score attained was -4.927, the critical z value, in absolute value, at .0005 is 3.291. This finding shows that there is a .05% chance that the scores achieved were due to chance rather than the treatment. According to the data, the null hypothesis was not a reasonable explanation for the effect on students' historical analysis ability. Differentiating according to Sternberg's Triarchic theory has a positive effect on student's historical analysis skill. To view the charts and graphs concerning the data, see Appendix A.

However, it then becomes a question of meaningfulness, or whether the significance attained is worth the time involved for designing, creating, and executing lessons that have been differentiated according to Sternberg's theory of Triarchic Intelligence. This option appears to rely on the educational philosophies of individual teachers as it is the teachers who are the designers, creators, and practitioners of lessons in their classrooms. Yet, the role of a teacher is to aid students in the quest to uncover

knowledge, skills, and understandings. Since differentiating by Sternberg's Triarchic theory of intelligence significantly deepens students' understanding of content, it should be utilized in the classroom.

Despite the changes to the design, the study still had the same basic structure including pre-treatment assessments and post-treatment assessments. These assessments were scored for historical analysis on a rubric. Though the affect of differentiation and Sternberg's Triarchic theory on students' learning environment was not measured, the effect on the historical analysis skill, the fundamental purpose of the study, was measured. Although execution of the design proved difficult, the data shows that differentiating by Sternberg's Triarchic theory of intelligences has a positive effect on students' historical analysis skill.

Chapter 5: Future Considerations

Sources of Error

There are two types of threats to validity, internal threats and external threats. Both types of threats were violated in this study. Internal threats to validity refer to the ability to single out one source of treatment as the sole contributor to the changes, if any, after the treatment. External threats to validity refer to the ability to generalize the research conclusion to the population at large.

A major source of error was human error; in executing the research design. Although it followed the basic format of the planned design, too much time lapsed between assessments both prior and after the treatment was introduced. This particular error is called maturation. As one can see from the chart (Appendix A2), the pre-treatment assessments do not level off into a constant before the treatment was introduced. This is a necessary component of the AB design. Prior to the treatment being introduced, methods of differentiating other than by Sternberg were utilized. Knowing whether any changes in scores of the assessments were due to traditional teaching methods or time is unclear. Likewise, traditional and differentiated lessons were used in the classroom once the treatment had been introduced. Improvement in the historical analysis scores can not be singularly attributed to differentiating by Sternberg Intelligences for this reason.

On all projects, feedback was given to direct students to the intended level of historical analysis. The feedback was necessary for students because inappropriate historical practice led to incorrect assumptions. The feedback was designed to lead students to the knowledge and understandings of the lesson; however, in doing so it taught students' historical analysis. While in terms of student knowledge, this leading

feedback is positive, it complicates the research data. Distinguishing the treatment from the feedback in determining what increased students' scores is unclear.

Minimal data was collected. The number of pre and post-treatment assessments conducted does not yield conclusive data. The rubric used to assess the data, despite being entirely based on both collegiate and government standards for history education, had never been field tested. It was the first rubric the author has made concerning historical analysis and researching a hypothesis. The rubric is therefore subject to error and the possible need of revision. No assessments for either the effect on learning environment or the understanding of historical analysis were made. Only the execution of historical analysis was assessed; therefore, the data does not reflect whether students learned the purpose of historical analysis nor whether they could identify the place it has in the framework of historical study; both are imperative components of meaningfulness to this study.

A third source of error was mortality, by which is meant student absence. Some students who were not present for instruction still turned in the assignments. Some students were absent and did not turn in assignments, or in some cases, students were present yet did not turn assignments. Looking at the chart in Appendix A1 reveals the missing data. There is one absence in the pre-treatment 2 column and numerous absences in the treatment 3 column. To use sound mathematical practice, ten students were disqualified from the study due to so much missing data; this reduced the sample size from 25 to 15 further reducing the samples representation of the normal distribution.

With so many threats to internal and external validity this study can not be considered conclusive. The internal threats prevent the treatment from being identified as

the cause of increase in students' scores. However, applying differentiation and Sternberg's theory of Triarchic intelligence is worthy of further investigation. Doing so requires improvement in design, execution, and control of the study.

Suggestions for Further Investigation

Despite the large sources of error, the data supports the hypothesis, that differentiating by Sternberg's theory of Triarchic Intelligence having a positive effect on students' ability to perform historical analysis, in the classroom. Therefore, this study merits further development and investigation so that more conclusive data may be found. To prevent internal and external threats to validity, and improve the conclusiveness of the study, the design needs to be restructured, data collection should be more thorough, and the rubric needs review and revision.

The design should be ABAB; in other words, pre-treatment 1, post-treatment 1: pre-treatment 2, post-treatment 2. This minimizes the impact of maturation, or time, as a source of error. A baseline should be established and it should develop into a constant before introducing the treatment. This will allow a more reliable assessment of the students' abilities prior to the treatment. The assessments should occur frequently without utilizing methods of teaching contrary to the assessment. Prior to the introduction of the treatment, all traditional methods must be used; once the treatment is introduced all teaching methods must be differentiated according to Sternberg's Triarchic theory until all the necessary data is collected.

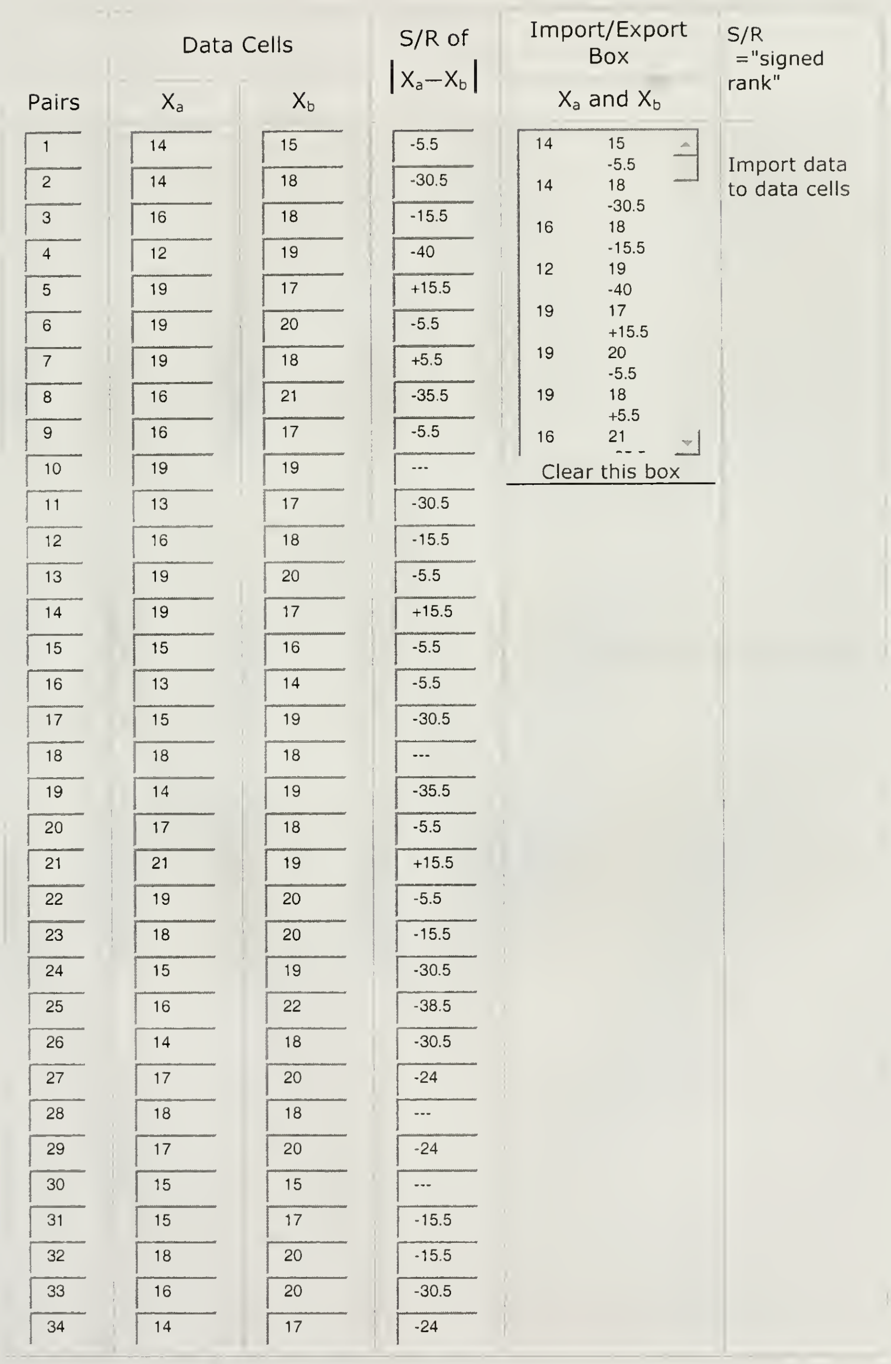
Along with strictly following the design strictly, the data must be collected in more sufficient volumes. Data is an integral component of the study as it determines the

outcome. Enough data to show a real change, if one occurs, rather than a continual progression is necessary. Equally valuable to the study is data concerning effect on learning environment, without which, any discussion of the meaningfulness is less potent. Data does not determine what pedagogical schema should be utilized; however, it aids teachers in reflecting upon best teaching practice.

The rubric should be reviewed by both education and history scholars to shape the implementation and the accuracy of the assessment. The rubric would then be refined according to their feedback. This will create a rubric which is more accurate, allowing it to be tested in the field further. A sample which better reflects the normal distribution should be chosen so that an analysis of the data is appropriate to the study and the population. Without doing so, one can not be ensured of the applicability of the results to the population.

These suggestions for future inquiry will reduce internal and external threats to validity while maintaining a productive classroom environment. While the nature of the classrooms implicitly produces error, a live classroom environment must be present for the study to simulate real student experience. While this environment can not reduce error as much as a laboratory setting, it does place the study into the context of real learning experience and is inherently more meaningful. To be conclusive, the study must simulate classroom environment while reducing the source for changes in students' scores to the treatment.

Appendix A1: Data Charts



Pairs	Data Cells		S/R of $\lvert X_a - X_b \rvert$
	X_a	X_b	
1	14	15	-5.5
2	14	18	-30.5
3	16	18	-15.5
4	12	19	-40
5	19	17	+15.5
6	19	20	-5.5
7	19	18	+5.5
8	16	21	-35.5
9	16	17	-5.5
10	19	19	---
11	13	17	-30.5
12	16	18	-15.5
13	19	20	-5.5
14	19	17	+15.5
15	15	16	-5.5
16	13	14	-5.5
17	15	19	-30.5
18	18	18	---
19	14	19	-35.5
20	17	18	-5.5
21	21	19	+15.5
22	19	20	-5.5
23	18	20	-15.5
24	15	19	-30.5
25	16	22	-38.5
26	14	18	-30.5
27	17	20	-24
28	18	18	---
29	17	20	-24
30	15	15	---
31	15	17	-15.5
32	18	20	-15.5
33	16	20	-30.5
34	14	17	-24

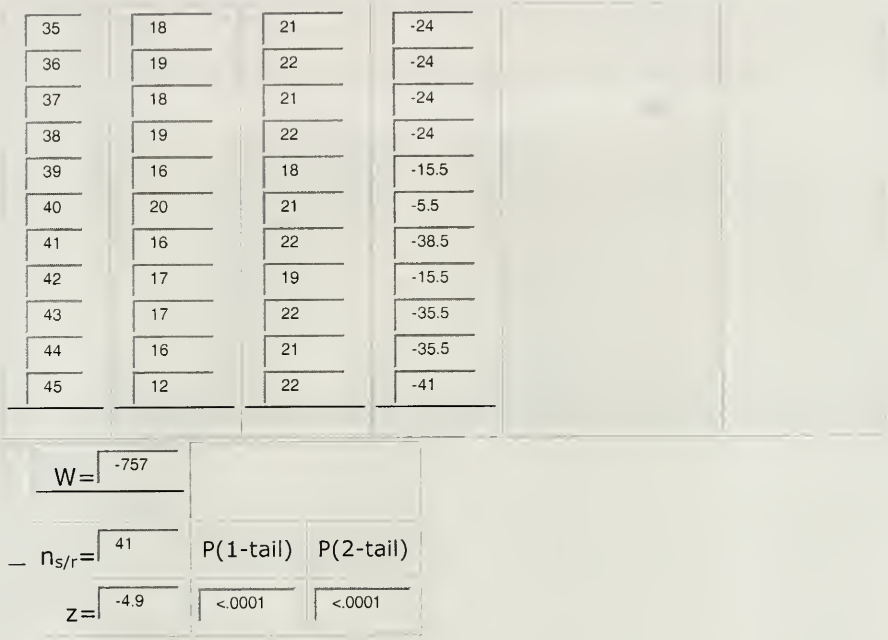
Import/Export Box

X_a and X_b

```
14      15
        -5.5
14      18
        -30.5
16      18
        -15.5
12      19
        -40
19      17
        +15.5
19      20
        -5.5
19      18
        +5.5
16      21
```

S/R ="signed rank"

Appendix A1: Data Charts



35	18	21	-24
36	19	22	-24
37	18	21	-24
38	19	22	-24
39	16	18	-15.5
40	20	21	-5.5
41	16	22	-38.5
42	17	19	-15.5
43	17	22	-35.5
44	16	21	-35.5
45	12	22	-41

W= -757

$n_{s/r}$= 41

	P(1-tail)	P(2-tail)
z= -4.9	<.0001	<.0001

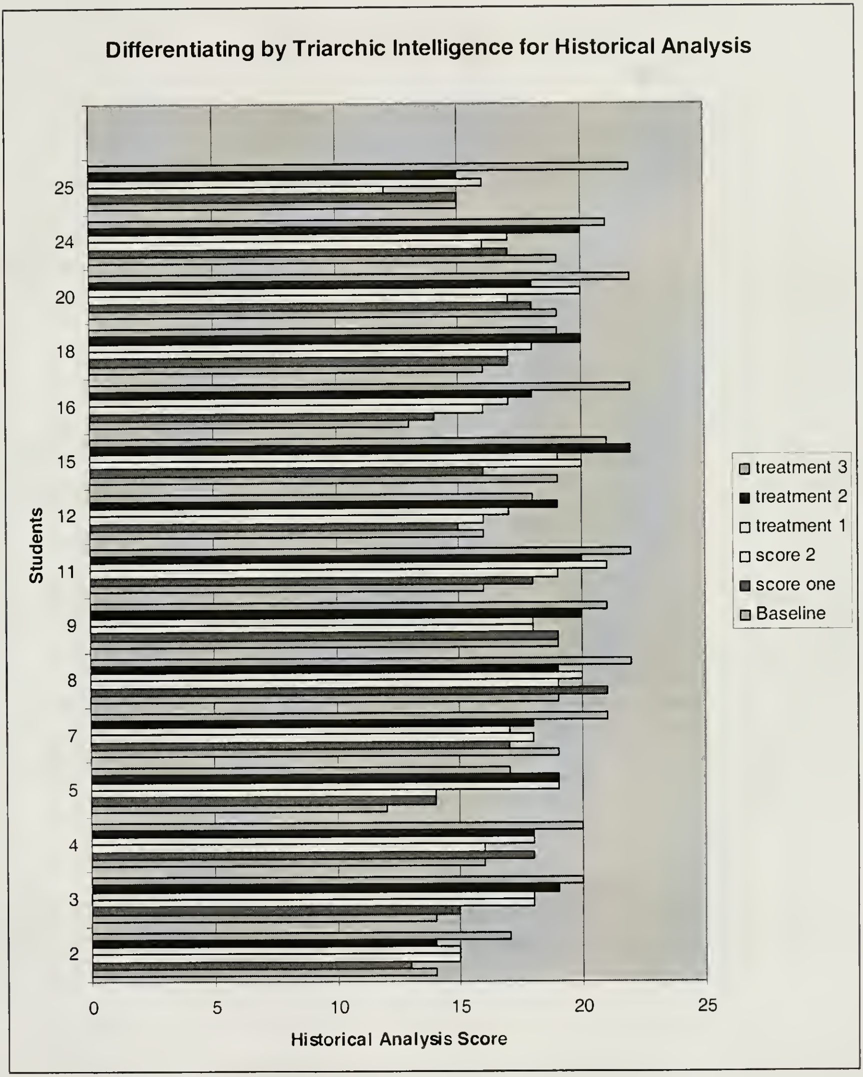
Critical Values of ±z

Critical Values of ±W for Small Samples

	Level of Significance for a Directional Test			
	.05	.025	.01	.005
	Non-Directional Test			
$n_{s/r}$	--	.05	.02	.01
5	15	--	--	--
6	17	21	--	--
7	22	24	28	--
8	26	30	34	36
9	29	35	39	43

Level of Significance for a Directional Test				
.05	**.025**	**.01**	**.005**	**.0005**
Non-Directional Test				
--	**.05**	**.02**	**.01**	**.001**
$z_{critical}$				
1.645	1.960	2.326	2.576	3.291

Appendix A2: Data Graph



Appendix B1: Historical Analysis Rubric

Historical Analysis Rubric

Teacher Name: **Samuel Wilkins**

Student Name: ______________________________

CATEGORY	4	3	2	1
Comparison	Can successfully compare and contrast differing sets of ideas, values, personalities, behaviors, and institutions with great depth	Can successfully compare and contrast differing sets of ideas, values, personalities, behaviors, and institutions with limited depth	Can compare and contrast differing sets of ideas, values, personalities, behaviors, and institutions on a basic level	Is incapable of comparing and contrasting differing sets of ideas, values, personalities, behaviors, and institutions
Historical Facts and Interpretations	Differentiates between a historical fact and a historical interpretation	Is competent at differentiating a historical fact from historical interpretation but not able to explain the difference	Is not competent at differentiating a historical fact from historical interpretation and is often inaccurate	Does not differentiate between a historical fact and historical interpretation
Perspective	Considers multiple perspectives in their understanding of events, peoples, and culture	Considers multiple perspectives in their understanding of events, peoples, and culture but displays obvious, but rational bias	Considers multiple perspectives in their understanding of events, peoples, and culture but displays obvious unfounded bias	Identity's self with only one perspective in a given event and excludes peoples and cultures which show polarity to it
Cause and Effect	Student can analyze cause and effect and sees the multiple factors influencing the cause (i.e. individuals, ideas, and chance)	Student can analyze cause and effect and sees some factors which influence the cause	Student can analyze cause and effect but does not see the multiple factors influencing the cause	Student can not analyze cause and effect
Historical Interpretation	Understand that the nature of historical interpretation is tentative			Sees historical interpretation as static
Influence of the Past	Understands that events, both historical and concurrent, are influenced by the past and can explain the relationship between them	Understands that events, both historical and concurrent, are influenced by the past but can not express their relationship	Can point out an instance of a historical or concurrent event that was influenced by the past but can not express the relationship	Sees events as isolated incidents

Appendix B1: Historical Analysis Rubric

Appendix B2: UCLA History Standards

Contents of Historical Thinking Standards for Grades 5-12	
Standard 1: Chronological Thinking	A. Distinguish between past, present, and future time. B. Identify in historical narratives the temporal structure of a historical narrative or story. C. Establish temporal order in constructing historical narratives of their own. D. Measure and calculate calendar time. E. Interpret data presented in time lines. F. Reconstruct patterns of historical succession and duration. G. Compare alternative models for periodization.
Standard 2 : Historical Comprehension	A. Reconstruct the literal meaning of a historical passage. B. Identify the central question(s) the historical narrative addresses. C. Read historical narratives imaginatively. D. Evidence historical perspectives. E. Draw upon data in historical maps. F. Utilize visual and mathematical data presented in charts, tables, pie and bar graphs, flow charts, Venn diagrams, and other graphic organizers. G. Draw upon visual, literary, and musical sources.
Standard 3 : Historical Analysis and Interpretation	A. Identify the author or source of the historical document or narrative. B. Compare and contrast differing sets of ideas, values, personalities, behaviors, and institutions. C. Differentiate between historical facts and historical interpretations. D. Consider multiple perspectives. E. Analyze cause-and-effect relationships and multiple causation, including the importance of the individual, the influence of ideas, and the role of chance. F. Challenge arguments of historical inevitability. G. Compare competing historical narratives. H. Hold interpretations of history as tentative. I. Evaluate major debates among historians. J. Hypothesize the influence of the past.
Standard 4 : Historical Research Capabilities	A. Formulate historical questions. B. Obtain historical data. C. Interrogate historical data. D. Identify the gaps in the available records, marshal contextual knowledge and perspectives of the time and place, and construct a sound historical interpretation.
Standard 5 : Historical Issues-Analysis and Decision-Making	A. Identify issues and problems in the past. B. Marshal evidence of antecedent circumstances and contemporary factors contributing to problems and alternative courses of action. C. Identify relevant historical antecedents. D. Evaluate alternative courses of action. E. Formulate a position or course of action on an issue. F. Evaluate the implementation of a decision.

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